> "The milk of cows at grass contains more A-factor than the milk of the same cows on their winter food. . . . At certain times of the year a child receiving fresh whole cow's milk may for this reason only be getting a small amount of this vitamin. . . . Breast-feeding is no protection against rickets if the mother's food is poor in A-factor."

The provision of fresh natural food-stuffs, although greatly to be desired, is a matter of much difficulty, especially in large towns, and is often impossible when military expeditions or explorations in barren regions have to be undertaken. Then the problem of preserving food-stuffs without destruction of their vitamins becomes of great interest and importance. The chief methods for the prolonged preservation of food are canning or bottling and drying, and a considerable amount of investigation has already been directed to the question how far these methods of treatment affect the vitamins. Up to the present, however, sufficient attention has not been paid to the influence of oxidation in these processes. The results so far obtained vary very much with the nature of the material employed. Thus vegetables on drying, as a rule, undergo a considerable loss of antiscorbutic power, that of cabbage being reduced by drying in the air at 37° to about 5-10 per cent. of the value of the fresh material. (The authors are not quite clear on this point, the somewhat misleading statement being made that "cabbage has been successfully dried by a special process devised by Holst and Fröhlich.") Retention of antiscorbutic power by material in the dry state seems to depend on the complete absence of moisture.

Heat sterilisation as applied in bottling and canning processes affects the antiscorbutic more than the other two vitamins, but the influence of oxidation is very great. However, it has been found in practice that a material originally rich in the vitamin, like the tomato, will withstand the commercial process and yield a powerfully active product, canned tomatoes having been successfully used for the prevention of scurvy. Again, lemon-juice in presence of the natural oil of the rind retains its potency for long periods. There seems, indeed, to the writer, to be no insuperable difficulty in the way of the provision of preserved foods containing at all events a large proportion of their original vitaminic potency. Much further investigation on this subject, on strictly quantitative lines, is, however, required, and at present each case must be separately examined, no generalisation being as yet justified. It is, moreover, not beyond the bounds of probability that some method will before long be found of enriching cheap edible oils so that they may supply vitamin A as well as energy at a reasonable cost.

Interesting problems are suggested by almost every page of this book, and it cannot fail to be of great value in disseminating sound doctrine on a subject concerning which there is now widespread ignorance.

Germany and English Chemical Industry.

Englands Handelskrieg und die chemische Industrie. Von Prof. Dr. A. Hesse und Prof. Dr. H. Grossmann. Band 1. Pp. iv+304. Band 2: Neue Folge. *England, Frankreich, Amerika.* Pp. iv+344. Band 3: *Dokumente über die Kali-, Stickstoff- und Superphosphat-Industrie.* Herausgegeben von A. Hesse, H. Grossmann, und W. A. Roth. Pp. iv+204. (Stuttgart: F. Enke, 1915-1919.) 98 marks.

THIS work consists of a series of translations of lectures, speeches, and articles by English, French, American, Russian, and Italian chemists, and by certain publicists like Lord Moulton, and by public bodies as the British Science Guild, which appeared at the outbreak of the Great War, or immediately prior to it. In addition, a number of utterances by public men and others, of more or less importance, have been culled from newspapers and the periodical press to support what is the apparent purpose of the publication, namely, to insinuate that the real motive which impelled England to participate in the war was her distrust and jealousy of Germany's industrial pre-eminence, especially in the chemical arts, and her consciousness that she was losing the world's markets owing to Germany's greater technical skill and scientific knowledge, and her better business organisation and financial methods. This idea is implied in the title of the work. It has been sedulously propagated in Germany that the real author of the war was England, and that it was solely to her diplomacy that the catastrophe was brought about—an explanation, and it may be added an exculpation, which doubtless commends itself to the soul of the Teuton.

There is, of course, no necessity to refute an implication which is notoriously at variance with the facts, and is certainly not held by ordinarily well-informed people, even in Germany. But it is characteristic of German mentality that it should have been seriously entertained even in 1915, when the first volume of this work was issued, and that persons of the position of its editors should have been found to support it.

The translations of the English lectures and addresses, most of which have appeared in the recognised journals dealing with applied chemistry, seem to have been well rendered, although exception may occasionally be taken to the comments and explanatory notes which the editors have appended. But it is more

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particularly to the tone and purport of the introductory matter which prefaces the several volumes, and for which they are solely responsible, that exception is chiefly to be taken.

At the same time there is an element of unconscious humour about the whole production. In view of the hardihood with which they reproduce, for the benefit of German readers, the many strictures on German commercial methods with which they have been visited, one is tempted to suggest that their knowledge of our national literature might have disposed the editors to prefix as a motto on their title-page the lines:

O wad some power the giftie gie us
To see oursels as others see us!
It wad frae monie a blunder free us
And foolish notion.

But possibly these strictures are really considered by them as implying a compliment to what they regard as their business acumen, but what other people are apt to characterise as "slimness."

Railway Electric Traction.

Railway Electric Traction. By F. W. Carter. Pp. viii+412. (London: E. Arnold and Co., 1922.) 25*s.* net.

THE problems of electric traction on railways deserve special study at the present time. In the past, electrification has been adopted, as a rule, only when abnormal difficulties, such as the existence of a long tunnel, busy urban traffic, very steep gradients, or a very high price for fuel, had to be overcome. It will be remembered that, largely as the result of a tunnel accident attributed to an accumulation of noxious gases, the New York authorities insisted that practically all lines entering the city should be electrified. The underground railways of London, the Simplon tunnel, and the Belt line tunnel of the Baltimore and Ohio Railway, electrified so long ago as 1895, are further examples. The Norfolk and Western Railroad, a heavy goods line, was electrified because of its long and steep gradients. For the same reason the Chicago Milwaukee and St. Paul Railway, which crosses the Rocky Mountains, had to electrify several of its sections. The development of electric railways in Switzerland, in Sweden, in Bavaria, and in Italy is mainly due to the high price of fuel in these countries.

It does not follow, however, that electric traction should be used only when special difficulties have to be overcome. When steam operation is a commercial success, the justification of electrical operation must be that it provides increased transport facilities with no increase in the rates. With steam operation individual power generation is employed, whereas with electrical operation the power is developed in bulk at central stations. In the electrical system a breakdown at a vital point may stop traffic over a wide area, and to obviate this risk a large amount of capital has to be expended in stand-by plant. In several cases, however, it is more advantageous for the railway to purchase its power from a "bulk supply" station. A disadvantage of a steam locomotive is that it consumes fuel so long as it is in commission; whether it is inside or outside the shed, and whether it is at rest or in motion. Tube-cleaning, oiling, and overhauling also occupy a considerable time. The electric locomotive, on the other hand, takes power only when running, and the time spent in inspection, overhauling, and cleaning is insignificant. Experience shows that for a given service the number of electric locomotives required is less than half the number of steam locomotives, but to make the comparison fair it has to be remembered that each electric locomotive must be debited with its share of the working costs of the central station.

The advisory committee of the Ministry of Transport has decided in favour of the direct current system, with a line pressure of 1500 volts, but multiples or submultiples of this pressure may be used. The French, Belgian, and Netherlands governments have come to a like decision. There are, however, thoughtful advocates of single-phase and polyphase systems. Luckily the difference in cost of the various electric systems does not exceed about one, or at the most two, per cent. of the total cost of running the railway. Although from many points of view standardisation of systems is desirable, yet we think that at the present time the carrying out of the single-phase system adopted by the London and Brighton Railway and the direct current system of the North Eastern Railway will be for the benefit of the country.

In the volume under notice the author gives an excellent discussion of the mechanical and electrical problems which traction engineers have to consider. He points out that the bad riding qualities of a locomotive are due to one or both of two general causes, namely, the constraint of the wheels to follow other courses than those towards which they naturally tend, and the setting up of resonant oscillations under the control of the springs. The phenomena of "nosing" and "rearing" he ascribes to the former cause, and those of "rolling" and "pitching" to the latter.

The book can be recommended to the traction engineer, who will find not only a good account of the most modern practice, but also many original dynamical discussions which have a direct bearing on his everyday work. It will well repay study.

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